REMARKS

Claims 1-27 are pending in this application, of which claim 1 has been amended. No new claims have been added.

The Examiner has objected to the drawings because FIG. 4 fails to show the scale and units of measurement on the y axis of the graph shown therein.

Page 15, lines 18-27 disclose:

> When the inventor of the present invention actually fabricated the optical repeater (the second embodiment) shown in FIG. 3 and measured its gain spectrum, a result shown in FIG. 4 was obtained. As shown in FIG. 4, a high light-emitting intensity was obtained for a broadband wavelength ranging from 1300 nm to 1600 nm. By the conventional optical repeater, an effective light-emitting intensity is obtained, even with wider estimation, only in a range from 70 nm to 80 nm between 1500 nm to 1600 nm approximately.

This passage suggests that units of "light-emitting intensity" are not necessary or critical to the invention because FIG. 4B is used to show a "high" light-emitting intensity from 1300 nm to 1600 nm. Even without being shown, the curve of intensity appears much higher within this range of wavelengths than outside this range of wavelengths.

Thus, Applicant respectfully submits that FIG. 4 needs no correction.

Claims 26-27 stand rejected under 35 U.S.C. § 112, first paragraph, as not being enabled by the specification.

The Examiner has requested clarification of the claimed term "1R repeater." Applicant respectfully submits that this term is well-known to those of ordinary skill in the art and will be explained as follows:

(1) There is known a "3R repeater" as an optical repeater. The 3R repeater converts an optical signal to an electrical signal, performs re-shaping, re-generating and re-timing to the electrical signal, and converts the electrical signal to an optical signal.

(2) On the other hand, a "1R repeater" re-amplifies an optical signal and outputs it without converting the optical signal to an electrical signal.

Accordingly, page 2 of the specification has been amended to include this description. No new matter is added by this amendment because the term "1R repeater" was originally disclosed.

Claims 1-3, 8-9, 22-23 and 26-27 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. patent 6,256,137 to Hironishi (hereafter, "**Hironishi**") in view of U.S. Patent Publication 2001/0043390 to Kim et al. (hereafter, "**Kim et al.**").

Applicant respectfully traverses this rejection.

Hironishi discloses a wavelength converter in which a first polarizer 1 separates an input light of the wavelength λ2 into an X polarized wave and a Y polarized wave normal to each other. The input light of wavelength λ2 is a linearly polarized wave. The X polarized wave is input to the second polarizer 3 after passing through an optical waveguide 2. The Y polarized wave is led by a reflecting device to the second polarizer. The refractive index of the waveguide 2 changes depending on the intensity of an input light. A signal light which is intensity-modulated according to a transmission signal and has the wavelength λ1 is input to the optical waveguide 2 waves. The second polarizer 3 couples the W and Y polarized waves. The third

polarizer 4 receives and outputs an output light from the second polarizer.

The Examiner has admitted that **Hironishi** fails to disclose a semiconductor optical amplifier including an active layer that has one type of structure selected from a group composed of a quantum dot, a quantum wire, a quantum dash, and a quantum well, but has cited **Kim et al.** for teaching this feature.

Applicant respectfully disagrees.

Kim et al. discloses a polarization insensitive semiconductor optical amplifier (SOA) in an optical amplifying element having a substrate and a multi-layer structure, crystal growth layer including an active layer formed on the substrate. The active layer is divided into first and second areas having different polarization modes. An electrode means independently applies currents to the first and second areas. Therefore, the polarization insensitive semiconductor optical amplifier is capable of separately controlling TE and TM polarization gains so as to approximately equalize the TE polarization gain to the TM polarization gain.

Although FIG. 2 of **Kim et al.** shows a TM area and a TE area, there is only one light input and only one light output path in single active layer 30.

This is in contrast to the present invention as shown in FIG. 1, in which there are two separate light inputs and two separate light outputs. This is because it has two of the structures shown in FIG. 2, as disclosed from page 7, line 27 to page 8, line 9 of the specification of the instant application. FIG. 1 shows two light inputs and two light outputs for the quantum dot optical amplifier 1 of the instant application.

Accordingly, claim 1 has been amended to recite this distinction.

Furthermore, regarding claim 8, the Examiner urges that FIG. 4, item #4 of **Hironishi** discloses "a converter for converting the TM wave into a TE wave."

Applicant respectfully disagrees. Column 5, lines 21-34 of **Hironishi** disclose:

> The polarizer 4 is set to make a predetermined angle with a plane of polarization of a light output from the coupling device 3 when the phase of an X polarized wave and the phase of a Y polarized wave input to the coupling device 3 indicates a specific relationship. For example, the polarizer 4 is set to make the same angle as the angle of the plane of polarization of the light output from the coupling device 3 when the phases of the X and Y polarized waves match each other. In this case, when the coupling device 3 is a polarizer, the polarizer 4 is set by rotating it, centering on the direction of the passing light, to make 45 or 135 degrees with the polarizer as the coupling device 3. The polarizer 4 separates the output light from the coupling device 3 into two polarized waves normal to each other.

Thus, item #4 is merely a polarizer, and not a converter, as required by claim 8.

Thus, the 35 U.S.C. § 103(a) rejection should be withdrawn.

Claims 6-7, 12 and 17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over **Hironishi** in view of **Kim et al.** and further in view of U.S. Patent 6,023,366 to Kinoshita (hereafter, "**Kinoshita**").

Applicant respectfully traverses this rejection.

Kinoshita discloses an optical amplifier and has been cited by the Examiner for teaching the following elements recited in claim 6:

- an input detector for detecting an intensity of the inputted light; [Fig. 12, #146]

  [Col. 13, lines 49-55]

- a variable optical attenuator for attenuating a light outputted from said multiplexer; [Fig. 12, #156]
- an output detector for detecting an intensity of a light outputted from said variable optical attenuator; and [Fig. 12, #162] [Col. 13, lines 7-26]
- an output controller for controlling an intensity of an output signal by controlling operation of said variable optical attenuator based on the intensity detected by said output detector. [Fig. 12, #164] [Col. 13. Lines 7-26]

The Examiner has specifically urged that spectrum monitor 146 corresponds to the "input detector for detecting an intensity of the inputted light," as recited in claim 6.

Applicant respectfully disagrees. Spectrum monitor 146 monitors the ASE spectrum, which means a range of wavelengths of light, but not the intensity of light, as required in claims 6 and 12 of the instant application.

Furthermore, item #162 in FIG. 12 is not an output detector for detecting the intensity of outputted light. Rather, it is an O/E converter which converts light to an electric signal.

Thus, the 35 U.S.C. § 103(a) rejection should be withdrawn.

Claims 4-5, 10-11, 13-16, 18-21 and 24-25 stand rejected under 35 U.S.C. § 103(a) as unpatentable over **Hironishi** in view of **Kim et al.** and **Kinoshita**.

Applicant respectfully traverses this rejection.

The Examiner has urged that **Kim et al.** teaches the optical repeater wherein said demultiplexer and said multiplexer are monolithically integrated into a PLC with said semiconductor optical amplifier.

As noted above, **Kim et al.** fails to disclose either dual input and dual output construction recited in claim 1, from which claims 4-5, 13, 15, 18 and 20 depend, or the converter recited in claim 8, from which claims 10-11, 14, 16, 19 and 21 depend.

Thus, the 35 U.S.C. § 103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 1-27, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Check in the amount of $120.00

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